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ATONY OF THE BLADDER WITHOUT OBSTRUCTION OR SIGNS OF ORGANIC NERVOUS DISEASES.*

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To the surgeon, atony of the bladder is a sufficiently familiar phenomenon. For clinical purposes such cases have hitherto been arranged in two well-defined groups, those in which the atony results from obstruction to the outflow, and those in which organic nervous disease is present to explain the want of contractile power of the bladder. To the former group belong cases of enlargement, simple or malignant, of the prostate, and stricture; to the latter group, the cases of diseases of the spinal cord when the nervous control of the bladder has become early and severely affected. These cases usually drift to the surgeon under mistaken diagnoses of stricture or some form of obstructive diseases. Then there is another class of case of nervous disease, where the patient appeals to the surgeon for relief of secondary phosphatic stones in the bladder, or of chronic cystitis, resulting from

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repeated infection by means of the catheter. All these clinical types are familiar. I mention these two preliminary groups so that I may pass, with less fear of being misunderstood, to a third class of cases, which I now propose to discuss.

Such cases have atony of the bladder, but no obstruction to the outflow, and no signs of organic nervous disease can be discovered. Let me first relate a series of cases and then discuss them.

CASE I.—J. M. (VI 575), a well-built man of twenty-eight years, a salesman, came under my care at St. Peter's Hospital in July, 1909, complaining of difficult micturition and nocturnal dribbling. He first noticed difficulty in micturition five or six years before I saw him. The onset was insidious, and the trouble gradually increased. Twelve months ago, he had large steel instruments ($18/15$) passed on several occasions at a general hospital, but without benefit.

For the last six weeks his water had dribbled away at night. He usually got up twice to pass it, but if he did not wake, his bed was soaked. He denied syphilis, but stated that he had an attack of gonorrhœa seven years ago.

When I examined him there was difficulty in starting micturition, and he frequently waited three or four minutes. The stream was slow and there was a good deal of after-dribbling. Large metal sounds ($14/16$) passed into the bladder without any difficulty. There was residual urine varying in amount from four to six ounces.

On cystoscopy, the whole bladder showed a very pronounced degree of trabeculation (Fig. 2). There was a thick interureteric bar. The ureteric orifices were normal. The mucous membrane was clear, the blood-vessels somewhat dilated, especially at the base. The urethral orifice showed no abnormality. I could find no evidence of nervous disease, and referred him to Dr. Purves Stewart, who reported that "his pupils, cranial nerves, sensory, motor, and reflex functions were all normal."

CASE II.—G. W. B. (VII, 526), a wood machinist, aged thirty-seven, was brought to me by Dr. Robert Purdie. Fourteen years ago he began to have difficulty in passing water, and this had gradually increased. During the past four months there had been

a decided increase in the difficulty. There had never been complete retention. He denied venereal disease. He passed water only once a day, and not at all at night. Micturition was performed from a sense of duty, not from a natural desire. He had to wait for some minutes before the urine commenced to flow. The stream was small and feeble. It came in intermittent spurts induced by straining. About an ounce was passed at a time. He frequently had to wait for a quarter of an hour before the stream commenced again. There was some aching at the sacral base. There were no other urinary symptoms. The urine was clear, had a specific gravity of 1006, and contained no albumin. The bladder was distended almost to the level of the umbilicus. A pint of urine was removed, and the bladder was still palpable above the pubes. The prostate was normal in size, with a broad median sulcus. There was no stricture or other obstruction to the introduction of large instruments. Cystoscopy showed well-marked trabeculation of the bladder, which was most marked on the right side. The trabeculation extended to the apex, but was not so pronounced at the higher part of the bladder as at the base.

The orifice of a solitary small diverticulum with sharply cut edge was seen to the right and behind the right ureteric orifice. The trigone and ureteric orifices were normal. The urethral orifice was normal. I could find no evidence of nervous disease, and Dr. Purves Stewart confirmed this opinion.

CASE III.—G. W. (VII, 141), a lamp-lighter, aged forty-one, came under my notice at St. Peter's Hospital in March, 1910, complaining of "stoppage of water." Four years ago he noticed that the stream was slow and small, and he made water "pretty frequently." Two years ago the difficulty increased, and he almost had retention, but it was not quite complete.

He had little desire to pass water, and would go all day from morning to night without attempting to do so. Usually, however, he passed water three or four times during the 24 hours, from the belief that it was proper for him to do so, but not from any desire.

There was a delay of a half to one minute in commencing micturition. The stream was poor, dropping, and intermittent. There was a good deal of after-dribbling. There was some aching in the right sacro-iliac synchondrosis, but he had no actual

pain. On one occasion he had passed some blood in the urine after a long bicycle ride.

He had lost flesh and strength during the last 18 months. He denied venereal disease. A year before I saw him, an instrument had been passed at two different hospitals under the impression that there was a stricture.

On examination the prostate was small and elastic, and nothing abnormal was detected by rectum. A large instrument was passed into the bladder without a hitch. There were 20 ounces of residual urine on one occasion and 22 on another. There was a moderate degree of trabeculation of the bladder and a small diverticulum was seen high up on the right wall. The prostate was not enlarged *per rectum* or intravesically. Dr. Purves Stewart reported, "I cannot find any evidence of organic disease in his nervous system."

CASE IV.—H. S. (VI, 59), aged thirty-four, complained of frequent micturition and soaking the bed at night. He gave the following history: He contracted syphilis in 1895, and was treated for two years. He first noticed difficulty in micturition and increased frequency in 1898. The frequency amounted to six or eight times during the day and not at all at night, and this increased during these years to half-hourly frequency during the day and once at night. There was a difficulty in starting, and the patient had to wait some minutes before the flow commenced. He was admitted to St. Peter's Hospital in 1901 with these symptoms. The stream was intermittent and there was after-dribbling. Occasionally he had to go to stool to get the water to pass. No stricture was found, there was no residual urine, and the bladder, examined by the cystoscope, was healthy. "The cut off muscle was divided" by the surgeon in charge of the case and the patient was said to be relieved.

When I saw him in 1910, he still complained of difficulty in starting micturition and straining during the act. The flow was intermittent. It commenced with fair force, but gradually fell away into a dribble. When the bladder was full and he lifted a heavy weight or coughed, a little urine escaped; there was a slight escape from the rectum also at any undue muscular exertion. He had passed urine every hour and a half to two hours and had soaked the bed at night for the past 12 months. The prostate was not enlarged by rectum. The urethra admitted the

largest instruments without obstruction. There was moderate trabeculation of the bladder and some dilatation of the vessels at the trigone. There was no intravesical enlargement of the prostate. There were seven ounces of residual urine. There were no signs of nervous disease.

CASE V.—J. G. C. (V, 533), a wireman, aged fifty-nine, was sent to me at St. Peter's Hospital in May, 1908, by Dr. C. W. Chapman. He was in good health until 18 months ago, when he showed symptoms of plumbism, for which he was treated.

He then came under Dr. Chapman's care for aortic and mitral lesions, and was sent to me on account of dribbling of his urine. He stated that four months before I saw him he had experienced scalding and great difficulty in passing water. Some time later he began to dribble at night, and this had continued. He passed water four or five times a day in a poor dropping stream. He had noticed a swelling of the abdomen for six weeks.

When I examined him the bladder was greatly distended and reached well above the level of the umbilicus. He suffered from thirst, headache, and a dry skin, and his appetite was poor. The tongue was dry. The prostate was small and soft. I admitted him to the hospital and his urine was slowly drawn off. There was no obstruction in the urethra. After the bladder had been emptied, the urine was drawn off twice daily. There was marked trabeculation of the bladder. The prostate did not project into the bladder. Dr. Purves Stewart found no organic nervous lesion.

CASE VI.—H. C. (V, 584), a laborer aged thirty-three, came under my observation at St. Peter's Hospital in May, 1908. He stated that he had suffered from difficulty in making water and some frequency for five years. The onset was gradual. Instruments were passed at a general hospital, but without any improvement in his symptoms. The frequency of micturition increased after this, and he passed water every quarter of an hour during the day, but not at all at night.

He was attended at St. Peter's Hospital in 1904, when it was noted that his urine was clear, with a few filaments. He passed water every hour and four or five times at night. Instruments were passed from time to time, but without improvement in his symptoms. In March, 1906, he was admitted to the hospital, and the urethra examined under an anæsthetic. Large steel instruments were passed, but no stricture was found.

I examined him in May, 1908. He complained of great difficulty in passing water. He had to wait some minutes before starting and strained during the act. So long as he kept straining with the abdominal muscles, the stream would flow, but whenever he ceased straining, the flow ceased.

At this time he passed water every two hours and not at all at night. The difficulty was increasing. From time to time he was unable to pass water at all, and he drew it off with a catheter. There was no obstruction to the passage of large instruments. The prostate was normal in size and consistence. There were ten ounces of residual urine. The bladder was trabeculated and the base rather puffy in appearance. No symptoms of nervous disease could be elicited.

CASE VII.—J. K. (VI, 129), a sweep, aged forty-six, came to me at St. Peter's Hospital in March, 1909, complaining of difficulty in micturition. He had noticed the difficulty for eight years, and it had gradually increased during that time. He also stated that he did not get an erection of the penis. When he attempted to pass water, he had to wait a minute or more before the flow commenced. The force was poor, the stream dropping down a foot in front of him. There was some after-dribbling. He passed water every hour during the day and three times at night. If he got excited, he felt an urgent desire to pass water, and had to pass it at once.

He had never had complete retention. The urine was clear, acid, and contained no albumin, mucus, or pus. The prostate was normal in size and consistence. There was no urethral obstruction. The bladder contained eight ounces of residual urine. It was slightly trabeculated, but otherwise healthy. No symptoms of nervous disease were elicited.

CASE VIII.—R. B. (VI, 364), aged thirty, came to my out-patient department at St. Peter's Hospital in January, 1909, complaining that his urine passed very slowly. I had examined him previously in August, 1907, when he stated that for 12 months he had experienced difficulty in starting micturition, and waited some seconds before the flow commenced. There was pain in the left groin on micturition. The urine was clear, there was no stricture and the prostate was normal.

In May, 1908, I again noted "difficult micturition, no stricture."

In January, 1909, he stated that the difficulty had increased.

He waited a minute before any urine appeared; the flow commenced gradually, the stream was poor, and dropped a few inches from the meatus, and finished up in a dribble. There was occasionally burning in the urethra after micturition. The urine was clear. He denied syphilis, but admitted an attack of gonorrhœa 26 years previously.

The urethra admitted large instruments without obstruction; the prostate was normal in size and consistence. There were four ounces of clear residual urine. The bladder showed trabeculation. No symptoms of organic nervous disease could be detected.

CASE IX.—A. P. (VII, 479), a joiner, aged sixty, consulted me at St. Peter's Hospital in May, 1910, in regard to difficulty in micturition. He thinks he got a chill 12 months ago, and from that time the water passed slowly and with difficulty. This had been increasing, and three months ago he began to pass water at night. The water became thick six months ago and he once noticed some blood in it.

At the present time he waits half a minute before micturition commences; at first it dribbles and gradually gets a little stronger. At its height the stream is small and drops a few inches in front of the penis. It tails off into a dribble. There is suprapubic pain and pain to the right of the umbilicus on micturition. He is losing flesh a little. There is no history of stone or gravel. He denies syphilis, but states that he had one attack of gonorrhœa. The urine is cloudy with well-mixed pus and shreds. On examination the bladder was found to be distended to a little above the level of the umbilicus. The prostate was small and elastic. There was no obstruction to the passage of large instruments. The nervous system shows no sign of organic disease.

The nine cases that I have related fall under neither of the two preliminary categories into which cases of atonic bladder are ordinarily divided.

First, no evidence of obstruction could be obtained. The anterior urethra was examined in most of the cases with the urethroscope under air distention. In all of them large metal instruments were passed ($13/15$ to $15/17$), and the vesical orifice of the urethra was examined with the cystoscope. The rectal surface of the prostate was examined with the finger

and the vesical surface with the cystoscope. No abnormality was detected by these methods. Second, no signs of organic nervous disease could be elicited. In four of the cases I had the advantage of an opinion from Dr. Purves Stewart. In sifting the cases I have been particularly careful to exclude cases of early and irregular forms of disease of the spinal cord.

I shall now examine the characteristics of these nine cases. With two exceptions the symptoms commenced below the age of 40 years, and most were under 30 years (22, 23, 37, 22, 57½, 28, 38, 30, 59). There was a history of syphilis in two cases and of gonorrhœa in four others. The remaining three patients denied venereal disease. The common feature in all the cases was the gradual onset and increase of difficulty in micturition. The flow did not start promptly, there being a pause of some seconds or even minutes before the urine began to pass. The stream was feeble. It might commence with fair force, and then fall away into a dribble, or it might dribble at the start and gradually increase in strength and then relapse again into a dribble. It usually dropped a foot or so away from the patient. The stream was often intermittent—sometimes it was only projected at all by forced efforts of the abdominal muscles with a fixed diaphragm. At each respiration the flow ceased and recommenced as the diaphragm was again fixed and the compression renewed. The voluntary effort might be insufficient to start the stream at once, and in one instance the patient had to wait a quarter of an hour before the flow became re-established. At the end of micturition the stream again fell away into a dribble. In only one case had there been acute retention, and this recurred from time to time, and required the passage of a catheter.

Chronic distention of the bladder was present in four cases, the bladder reaching up to and above the umbilicus. In these cases the power of voluntary micturition remained, although greatly impaired. In the remaining cases residual urine was present and varied in amount from four to ten ounces. In one case there was an escape of urine on coughing and on any muscular effort. In this case, and in another, there was noc-

tural dribbling from an over-distended bladder. In two cases the frequency of micturition was diminished. These patients informed me that they had no desire to pass water at any time. They might pass water once or twice in twenty-four hours, and if they did so oftener it was from a sense of fitness, not from any sensation of distention or of necessity. There were three patients who passed water more frequently than normal, as often as every hour during the day and several times at night. In two of these cases there was no question of the increased frequency being due to cystitis or other inflammation, for the increase had commenced spontaneously, before the passage of any instrument, and the urine was absolutely clear. In two of these cases there was no trace of inflammation in the bladder; in the third, the bladder base was somewhat puffy, and in this case there were a few filaments in clear urine. Any inflammation that might have been present in this case was insufficient to explain the frequency of micturition.

On cystoscopy there was in all these cases well-marked trabeculation of the bladder wall. This was usually general; sometimes one side was more trabeculated than the other, usually the trabeculation was less marked in the region of the apex than elsewhere. In three cases the trabeculation was extreme. In two less pronounced cases a solitary small diverticulum was present.

There was occasionally dilatation of the veins at the base of the bladder. The mucous membrane was clear and healthy in all except one case, where it was slightly puffy at the base. The ureteric orifices were normal. In one case the interureteric bar was thickened.

I shall now turn to discuss some points in regard to these cases.

1. What was the condition of the muscular apparatus of the bladder?

In dealing with the symptomatology, I have noted that the power of expelling the urine was diminished to a varying extent. This reduction of the effective power of the detrusor

muscle was measured by the manner in which the act of micturition was performed, and by the quantity of residual urine. The loss of power of the detrusor muscle usually commenced insidiously and was progressive; occasionally the onset was almost sudden and some amount of the power was regained. In one case the atony suddenly increased after being moderate for 14 years, so that the bladder became distended to above the level of the umbilicus. In another case there was a greatly distended bladder after 12 months, and in another after 18 months.

The condition of the muscular wall as shown by the cystoscope was very striking in all these cases. In all of them there was marked trabeculation, and in two the trabeculation was far in excess of anything that I have seen in other diseases of the bladder, of whatever nature. Where the trabeculation was moderate in degree it affected the lateral walls low down near the trigone, and to a less degree, the apex of the bladder. One side of the bladder might show trabeculation while the other was smooth. In some of the cases a tense, sharp band of muscle passed across a portion of the bladder wall and the wall above or below this was deeply hollowed. Where the trabeculation was present in a marked degree, it was universal, all parts of the bladder being affected, except the trigone, which remained unaltered. The larger muscle-bundles were sharply defined and widely separated. They stood out like round cords and branched into smaller strands, which disappeared in the general network. Between these larger bundles there were saucer-shaped depressions of varying depth, the walls of which showed fine secondary interlacing muscle-bundles.

The degree of trabeculation did not correspond to the amount of residual urine, nor to the duration of the symptoms. One patient with 20 ounces of residual urine, and symptoms which had lasted for 14 years, had a considerable degree of trabeculation most marked on the right side; another patient with an equal quantity of residual urine and symptoms for four years showed only slight trabeculation, while a third with four ounces of residual urine and symptoms for five or six years had universal trabeculation of an extreme degree.

Trabeculation has hitherto been regarded as a sign of hypertrophy of the bladder, and its presence has been looked upon as proof that obstruction to the outflow of urine was present. I have long suspected that there must be other factors in the causation of trabeculation of the bladder, which might act with obstruction or apart from it. In the first place I have frequently observed trabeculation of the bladder where obstruction to the outflow was certainly absent, where there was no difficulty in micturition, and where there was no obstruction to the introduction of full-sized instruments through the urethra. I should be departing too far from the object of this article were I to bring forward more than one case in support of this statement.

Let the following example suffice :

I saw F. M., a barrister, aged forty-six, in consultation with Dr. F. E. Batten. He gave the following history :

In May, 1909, he had an attack of hæmaturia following a game of golf, and there was some pain in the left side of the abdomen. The urine cleared and on examination contained hyaline and finely granular casts, a few red blood-corpuscles, renal cells, and calcium oxalate crystals. In November, 1909, he had an attack of renal colic on the left side, which lasted twelve hours. A radiogram showed a small calculus in the pelvic segment of the left ureter. He had no increased frequency until he was put on diuretics and large quantities of barley water, when he passed a good quantity of water every two hours, and rose once at night. There was no difficulty, pain, or discomfort on micturition. The prostate was normal in size and consistence, and there was no obstruction to the passage of large instruments. There was no residual urine. On cystoscopy the ureteric orifices were normal, and the mucous membrane of the bladder healthy. There was very marked trabeculation of the bladder, which was well distributed over the bladder. It was most marked at the base and at each lateral wall and not so marked at the apex. Dr. Batten assured me that there were no signs of organic disease of the nervous system. The trabeculation in this case was not due to hypertrophy produced by obstruction.

Nitze was the first to observe trabeculation of the bladder with the cystoscope in the early stages of *tabes dorsalis*, while Orth and others have described the condition post mortem in old-standing cases of *tabes*.

In an article on this subject Bohme¹ has described eight cases of *tabes dorsalis* in the early stage in which trabeculation of the bladder was present, and he looks upon this condition of the bladder as a diagnostic sign of *tabes* in the earliest stage. My own experience of the bladder in *tabes* is confined to 31 cases, nearly all of which were of the peculiar type in which the bladder is early affected whilst the other nervous symptoms are insignificant, and they usually came to me without any knowledge of their nervous disease. These cases correspond to those on which Bohme writes. In these cases some degree of trabeculation was usually present. It was, however, not infrequently absent, and in none of the cases was the degree of trabeculation so extreme as in two of the cases I have just described.

There is, therefore, I submit, a considerable body of evidence to show that trabeculation of the bladder may be observed in a pronounced degree quite apart from any of the gross forms of urethral obstruction with which we are familiar. There is a difference between this form of trabeculation and that which is observed in obstructive diseases. The trabeculation of an obstructed bladder is coarse, the muscular ridges thick and irregularly branching, and the interspaces deeply pouched; the openings of the sacculæ are often narrow (Fig. 1). In the trabeculated bladder without gross obstruction, the muscle ridges are fine and evenly set and the branchings regular and orderly (Fig. 2). Very fine twigs can frequently be seen branching and interlacing. The interspaces are not so deep and in my cases were usually saucer-shaped. The distribution of the trabeculation is also different. In the obstructed bladder the trigone is broken up into hypertrophied ridges. The ureteric bar is hidden among a number of thick trabeculæ, and it is often difficult to find the ureteric orifices. The rest of the bladder is also affected. In the unobstructed

FIG. 1.



Trabeculation of the bladder due to hypertrophy (case of enlargement of the prostate).

FIG. 2.



Trabeculation of the bladder due to atrophy (Case I).

trabeculated bladder, as Bohme has pointed out, the side walls and the apex of the bladder are affected, while the trigone escapes.

In the cases that I have just described the trabeculation was sometimes localized or more marked on one side than on the other. The area usually affected in such cases lay outside and behind the ureteric orifices and there might be a solitary area of trabeculation here while the rest of the bladder surface was unchanged. A solitary muscle band sometimes stood up strongly for a considerable distance. Such fine distinctions, while they do not invariably hold good, may certainly be recognized in the majority of cases.

Bohme adopts a theory which V. Frankl-Hochwart² advanced to explain difficult micturition and retention in disease of the spinal cord, namely, that the sphincter is unable to relax, and he looks upon the trabeculation in cases of tabes as due to this cause acting as an obstruction. According to this author, therefore, these tabetic bladders are to be ranged along with that of enlarged prostate and of stricture. I do not feel satisfied with this explanation. In one of my cases the bladder sphincter shared in the atony of the detrusor, for there was an escape of urine on coughing or on any muscular exertion, and in this case, with only seven ounces of residual urine, and another case, with from four to six ounces of residual urine, there was unconscious dribbling at night. Obstruction by the sphincter could, therefore, be excluded in these cases. The trabeculated bladder, which is not secondary to any of the tangible forms of obstruction, such as enlarged prostate or stricture, may be explained in another manner, if we can rid ourselves of the belief that trabeculation necessarily means hypertrophy. I would venture to suggest that the earliest change in these cases is atrophy, and that the prominence of some muscle-bundles is largely due to atrophy of the neighboring bundles. The greater calls that are made on the surviving bundles may be supposed to call forth a compensatory hypertrophy, but this is insufficient to do more than partly replace those that have atrophied. This suggestion fits in well

with the condition observed in cases of diseases of the spinal cord, for it is one of the characteristics of these cases that a considerable amount of improvement may take place in the muscular power of the bladder after the first few months or year of the atony.

2. What was the condition of the sensory apparatus of the bladder?

The sensibility of the bladder in these cases varied. In two cases it was certainly blunted, if not abolished. The patients felt neither the sharp sensation of the contact of urine with the mucous membrane of the prostatic urethra, nor the feeling of tension and weight above the pubes and in the perineum or penis that is experienced by normal individuals. These patients would go through the whole day without passing water and without discomfort. On the other hand, there were three cases where frequent micturition and urgency were prominent symptoms. In these cases the urine did not show evidence of cystitis, and the cystoscope displayed no inflammation. The mucous membrane of the bladder was undoubtedly hypersensitive in these patients. In the remaining cases there did not appear to be either diminution or increase in the sensibility of the bladder.

Every cystoscopist is familiar with the difficulty which a patient experiences in commencing micturition after the prostatic urethra and bladder-base have been rendered anæsthetic by means of cocaine instillation. The inability to pass water lasts a quarter or half an hour and then passes off as the effect of the drug disappears. While the prostatic urethra and bladder-base are still anæsthetic, it is often possible by a voluntary effort to start micturition, and, once started, the flow is sustained, with a force as great as in a normal individual. If micturition cannot be initiated and a catheter is passed, the fluid flows with as much force as where no anæsthetic has been applied. When urine has been passed voluntarily from a cocainized bladder, there is no residual urine left if none was present before the application of the anæsthetic. It therefore appears that anæsthesia of the bladder or of the prostatic

urethra, if judged by this standard, can only prevent the initiation of micturition, but does not affect the contraction of the bladder muscle once it is started.

Dr. Parkes Weber³ has recorded an interesting case of paralysis of the bladder in a man aged 57 years. The patient was not aware whether his bladder was full or empty. Dr. Weber suggested that "a local hypo-anæsthesia (occurring as an early symptom of nervous disease) was an important factor in this retention of urine and vesical dilatation." This theory is inapplicable to the cases I have recorded, for the following reason: anæsthesia of the bladder, as I have pointed out, may prevent micturition by preventing its initiation, but once micturition is started, the stream is full and strong, and no urine is left behind as the result of the anæsthesia.

In my cases the stream was not merely delayed, as in cases of anæsthesia, but it was also feeble. Whether passed through the urethra or through a catheter, the want of force was obvious. Moreover, there was a quantity of residual urine in all the cases. If anæsthesia were the cause of the vesical inefficiency, there should have been an absence of initiation of the act and therefore complete retention and inability to micturate in all the patients, but this was not the case. And further, as I have shown, there was hyperæsthesia of the bladder in three cases.

3. The relation of these cases to vesical atony, secondary to obstruction.

Atony of the bladder, partial or complete, is most familiar to the surgeon as a result of gross enlargement of the prostate. It occurs also as a result of stricture of the urethra. Such lesions are readily demonstrated.

There is a class of cases that require more careful consideration, for they are more difficult to diagnose and exclude. I refer to cases where there is slight enlargement of the prostate, or atrophy of the prostate, or fibrous conditions at the internal meatus.

It is well known that enlargement of the prostate may produce sufficient obstruction to cause chronic retention of urine without any enlargement being detected on rectal exam-

ination. Such cases are not common, but they are of sufficiently frequent occurrence to receive general recognition. In these cases there is either a small pea- or cherry-like intravesical projection of the prostate or a prominent rim, at the back and sides of the internal urethral orifice, that has been aptly called a "collar-like" projection of the prostate. Such changes are recognizable by means of the cystoscope. They are evident when the bladder is opened above the pubes, and the orifice is inspected or palpated.

Another form of obstruction that cannot be recognized by rectal palpation is "contracture of the neck of the bladder." In this condition there is a fibrous thickening of the tissues around the internal meatus. It appears to result from old-standing inflammation, usually of venereal origin. There is obstruction at the entrance of the bladder to the passage of instruments. Stenosis of the orifice can also be detected by the finger introduced through a suprapubic cystotomy wound. With contracture of the neck of the bladder or apart from it, there may be atrophy of the prostate, which results from a similar cause. Atrophy of the prostate is easily recognized by the finger from the rectum.

Any of these conditions may cause obstruction to the outflow of urine, and they must therefore be carefully excluded by rectal palpation, by the passage of sounds, by cystoscopy, and if necessary, by suprapubic cystotomy.

In sifting my cases I have rigidly excluded all cases where abnormality of the prostate or prostatic urethra or vesical orifice of the urethra could be detected by any of these methods. The following case came under my care before I realized that there might be atony without obstruction or signs of nervous disease.

CASE X.—G. H. (1906, II, 246), a healthy man of sixty-three years, was admitted to St. Peter's Hospital with chronic retention and overflow.

Four years ago his urine began to dribble and his bladder was found to be distended. His doctor passed a catheter.

For three years he passed a catheter twice daily, and then

was advised to cease using the instrument with the result that he had pain and difficulty in micturition. The urine has been foul and there has been hæmaturia. When I examined him, he passed urine every two hours and rose once at night. There was urgency to pass urine, but he had to wait five minutes or more before the flow commenced. There was pain at the meatus before micturition, and scalding during and after the act. The stream was poor in force and small in volume, and sometimes stopped in the middle of the act. There were clots of blood in the urine. He had had an attack of gonorrhœa at the age of twenty years. No symptoms of organic disease of the nervous system could be elicited. The prostate was normal in size and consistence. There was a quantity of residual urine, which contained blood and mucus. On cystoscopy there was cystitis and the bladder was trabeculated and there were sacculi. The prostate was not prominent in the bladder.

On August 1, 1906, the bladder was opened above the pubes and the prostate was examined. The prostate did not project into the bladder, and was small bimanually. Under the impression that I might have to deal with a case of contracture of the neck of the bladder, I forcibly dilated the prostatic urethra with my finger. Dr. Young of Baltimore was present at this operation, and suggested that a perineal prostatectomy should be done.

On August 30 the patient had recovered, but was entirely dependent on his catheter, passing no urine voluntarily. The urine was clear and without deposit.

On September 5 I performed perineal prostatectomy, dissecting away both lobes of the prostate. The patient was discharged on October 6 healed, and with clear urine, but absolutely dependent on his catheter.

From this case I learned that atony of the bladder might exist without signs of nervous disease, and be unrelieved by operation undertaken with a view to remove any possible obstruction.

4. The relation of these cases to tabes and other forms of disease of the spinal cord.

I have already referred to cases of early and irregular tabes as a cause of atony of the bladder and I do not intend to discuss these cases at present in detail. It is necessary, however,

to consider whether the cases I have described do not at a later period develop symptoms of tabes or other disease of the cord. None of these cases developed symptoms of disease of the spinal cord while they were under my observation. One might, I think, reasonably expect some symptoms of organic disease to develop in, say, three or four years after the bladder condition had become established. The following was the duration of the symptoms in these cases on the first occasion on which I examined them, and some of the patients have remained under my observation since: (1) five or six years, (2) fourteen years, (3) four years, (4) twelve years, (5) four months, (6) five years, (7) eight years, (8) two and one-half years, (9) three months.

I think there is here sufficient evidence to prove that these cases do not belong to the early and irregular forms of spinal disease.

Etiology and Nature of these Cases.—There is little information to be obtained from these cases in regard to etiology. So far as I could ascertain, only two patients had suffered from syphilis. One patient had had lead poisoning.

The reflex centre for the contraction of the bladder and the inhibition of the sphincter is placed, according to general belief, in the lumbosacral cord at the level of the third and fourth sacral segments. In diseases of the spinal cord, such as tabes, this centre is supposed to be affected, and atony of the bladder results as one of the symptoms of this disease. It is more difficult to explain the occurrence of disease confined to this centre affecting no other part of the cord.

Clinical and experimental researches by Goltz, Freusberg⁴ and Ewald,⁵ and C. R. Müller⁶ have shown that the lowest reflex centres, which control the functions of the bladder and rectum and the erection of the penis, are situated in the hypogastric and hemorrhoidal plexuses of the sympathetic. The cases that I have recorded are, I believe, to be explained by the existence of some lesion of this sympathetic reflex centre. This would explain the absence of symptoms of disease of the spinal cord which is a feature in these cases.

It is interesting to follow these cases into their later stages, and to note how secondary complications supervene and eventually conceal the original nature of the case. Without exhausting the resources of my clinic at St. Peter's Hospital, I have selected the following cases as representing the later stages of the disease.

CASE XI.—W. J. J., a journalist, aged fifty-three, was sent to me by Dr. J. M. H. MacLeod, complaining of thick urine. Eighteen years before I saw him, when thirty-five years of age, without apparent cause and without warning he suddenly lost the power of passing water. Since that time he had never passed urine voluntarily. All his urine was drawn off by catheter, which he passed himself without difficulty. His bladder became infected, and the cystitis varied in severity from time to time. He admitted one attack of gonorrhœa, but denied syphilis. When I examined him he was passing his catheter every two hours during the day and twice at night. The urine was foul and thick with shreds and mucopus. There was no obstruction to the passage of instruments through the urethra. The prostate was small but not atrophied. There were no signs of organic disease of the nervous system.

CASE XII.—W. E., a coachmaker, aged forty-three, complained of inability to pass water. The onset was gradual two years ago when there was difficulty in passing water. This increased until he could pass no water voluntarily, and was entirely dependent upon his catheter. He drew off the urine from four to six times during the day and four or five times at night. A small stone formed in a pouch in the bladder and was crushed and removed. The urine was thick, alkaline and stinking. There was no obstruction to the passage of instruments and the prostate was normal. The bladder was trabeculated and showed numerous saccules. There were no signs of organic nervous disease.

In the twelve cases here described, we have to deal with atony of varying degree. The urethra shows no sign of obstruction, and the prostate is healthy; there are no signs of organic disease of the nervous system. In a number of the cases the atony has been present for a sufficient period of time

to be certain that tabes or other disease of the spinal cord will not develop. There are acute and chronic cases. Such cases, I submit, form a class by themselves.

Literature.—There is little in the literature that bears directly on these cases. A few cases have been published, which appear to me to be similar in nature. Albarran and Noguès⁷ have recorded two cases of retention of urine in young men, which they were unable to explain and could not classify. Mr. S. G. Shattock⁸ described a post-mortem specimen of dilated bladder and ureters, and suggested that that condition was of “infantile origin” and analogous to idiopathic dilatation of the colon. The case may possibly belong to this group. I have already referred to a case recorded by Dr. Parkes Weber which he regarded as one of early nervous disease. It is possible that this case was similar to those described. Professor Casper⁹ has recorded two cases of chronic retention of urine, one of which had signs of nervous disease and the other had none. The latter case appears to me to be similar to those I have described.

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